



# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office

*December 10, 2004*

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APPLICATION NUMBER: 60/519,974  
FILING DATE: *November 14, 2003*  
RELATED PCT APPLICATION NUMBER: *PCT/US04/38125*

Certified by



Jon W Dudas

Acting Under Secretary of Commerce  
for Intellectual Property  
and Acting Director of the U.S.  
Patent and Trademark Office

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16085 U.S. PTO

PTO/SB/16 (10-01)

Approved for use through 10/31/2002. OMB 0651-0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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# **PROVISIONAL APPLICATION FOR PATENT COVER SHEET**

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No.

EV068662585US

22532 U.S. PTO  
60/519974

111403

INVENTOR(S)					
Given Name (first and middle (if any))		Family Name or Surname		Residence (City and either State or Foreign Country)	
Marti		Frost		5626 Willers Way Houston, TX 77056	
<input type="checkbox"/> Additional inventors are being named on the _____ separately numbered sheets attached hereto					
TITLE OF THE INVENTION (500 characters max)					
Ballast Test Dummy					
Direct all correspondence to: CORRESPONDENCE ADDRESS					
<input type="checkbox"/> Customer Number		<input type="text"/>		<input type="text"/> Place Customer Number Bar Code Label here	
OR		Type Customer Number here			
<input checked="" type="checkbox"/> Firm or Individual Name		David M. Ostfeld David M. Ostfeld, Chamberlain, Hrdlicka, White, Williams & Martin			
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Address					
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Country	USA	Telephone	713-658-2505	Fax	713-658-2553
ENCLOSED APPLICATION PARTS (check all that apply)					
<input checked="" type="checkbox"/>	Specification	Number of Pages	8	<input type="checkbox"/>	CD(s), Number
<input checked="" type="checkbox"/>	Drawing(s)	Number of Sheets	16	<input type="checkbox"/>	Other (specify)
<input type="checkbox"/>	Application Data Sheet. See 37 CFR 1.76				
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT					
<input checked="" type="checkbox"/>	Applicant claims small entity status. See 37 CFR 1.27.				FILING FEE AMOUNT (\$)  \$80.00
<input type="checkbox"/>	A check or money order is enclosed to cover the filing fees				
<input checked="" type="checkbox"/>	The Commissioner is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number: 15-0697				
<input type="checkbox"/>	Payment by credit card. Form PTO-2038 is attached.				
The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.					
<input checked="" type="checkbox"/>	No.				
<input type="checkbox"/>	Yes, the name of the U.S. Government agency and the Government contract number are: _____				

Respectfully submitted,

SIGNATURE

Date

TYPED or PRINTED NAME

David M. Ostfeld

REGISTRATION NO.

(if appropriate)

Docket Number:

27,827

920873-03

TELEPHONE

713-658-2505

## **USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT**

This collection of information is required by 37 CFR 1.51. The information is used by the public to file (and by the PTO to process) a provisional application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the complete provisional application to the PTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Box Provisional Application, Assistant Commissioner for Patents, Washington, D.C. 20231.

**CHAMBERLAIN, HRDLICKA, WHITE, WILLIAMS & MARTIN**

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November 14, 2003

**CERTIFICATION UNDER 37 C.F.R. § 1.10**

**EV068662585US**

Express Mail Number

**November 14, 2003**

Date of Deposit


I hereby certify that this Application and the documents referred to as enclosed therein are being deposited with the United States Postal Service in an envelope as "Express Mail Post Office to Addressee," addressed to:

**MAIL STOP PROVISIONAL PATENT  
APPLICATION**

Commissioner for Patents

P. O. Box 1450

Alexandria, VA 22313-1450

  
By Yvonne R. Simera

**November 14, 2003**

Date of Signature

**MAIL STOP PROVISIONAL PATENT APPLICATION**

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Re: Title: **BALLAST TEST DUMMY**  
Inventor(s): **Marti Frost**  
Docket No. **920873-03**

Sirs:

This letter is a request to file a **PROVISIONAL PATENT APPLICATION** in the name(s) of **Marti Frost for Ballast Test Dummy** with the United States Patent & Trademark Office.

November 14, 2003

Page 2

Enclosed with this transmittal letter are the following documents:

- Patent Cover Sheet for Provisional Application (PTO/SB/16); and
- A Specification consisting of eight (8) pages and sixteen (16) pages of drawings; and

The Commissioner is authorized to charge the filing fee of \$ 80.00 or any additional fees, or credit any overpayment to Deposit Account No. 15-0697.

Please return the enclosed postcard to acknowledge receipt and filing of this application and forward all correspondence concerning the above-referenced application to the address appearing below.

Respectfully submitted,



---

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DMO:yrs  
Enclosures

## **Ballast Test Dummy**

### **Background of the Invention**

This invention is for the use of simulating the mass and weight of the human body. This apparatus has been created to fill a need in the test of automobiles; amusement park rides, seating components of all type and any apparatus that needs to simulate the body's weight.

BARTS™ water ballast test dummy is the primary current model utilized in these industries. Over the past seven (7) years we have been selling the BARTS™ water ballast test dummies to the automotive industry to be used to simulate body weight while performing a variety of tests including braking, axle, seat abrasion, road handling and tire traction, as well as a variety of other industries and for litigation purposes. The BARTS™ water ballast test dummy has been used in the majority of the major accident re-enactments for litigation such as the Ford/Firestone tire problem and the Ford 15-passenger van rollover problem.

The BARTS™ test dummy is the equivalent of a bottle shaped like the body from the neck to the knees. These are made of LLDPE and are rotationally molded with a 3" spin weld fill opening at the neck and a ½" spin weld drain plug at the "knees". The side of the dummy has weight markings so it can be filled to the desired weight level.

To our knowledge, we are the only company in the U.S. that manufactures this type of dummy. The other known test dummy manufacturer is in France. The French version only provides for weights up to 145 lbs (below the automobile and amusement park testing standards) and they must be purchased in quantities of a container load. In addition to the French version, recently a European ride manufacturer created a type of water ballast test dummy that appears to only fit their style of ride and cannot be used in any other industry because of its use specific design.

The test dummy of the prior art:

- a. only fits a portion of the today's rides; mainly standard bench seat rides with only lap bars.
- b. does not fit the seat that is used for major velocity rides, spiral rides, or 360-degree roller coasters due to the harness and belt system utilized to secure a person in these type seats and the inability to use these restraints when using the BARTS test dummy.

- c. does not provide a complete weight distribution and mass representation of the human body since they do not have arms, true legs or a head.
- d. cannot be used for slalom, stand-up or lay-down rides due to non-articulating design.

Prior to and currently the amusement parks use sand bags roped to the bottom of the ride or over the seat in order to simulate weight. There are some obvious inherent problems with this method. They include:

1. Time to load & strap sand bags to seat
2. Employee back strain from lifting these bags
3. Injury to people on the ground from bags falling out of the seat during testing
4. Does not test harness & locking system
5. The mess made from sand spilling out over the park when a bag breaks during testing
6. They do not accurately depict the weight distribution of a person

The next level of known test dummies is more electronic, computerized and/or structural in their design and usage. The other test dummies that I am aware of are the following:

- a. Biofidelic Human Seating Surrogate Apparatus – Patent # 6,206,703 B1 discloses a biofidelic human seating surrogate apparatus capable of simulating human loading by duplication of the geometry and load distribution of a human at an interface with the vehicle seat to be tested.
- b. Seat test Body - Patent # 6,009,750 discloses a seat test body that is provided for vibration measurements.
- c. Test dummy submarining indicator system – Patent # 3,841,163 discloses a test apparatus for indicating the degree of submarining of an anthropomorphic dummy under deceleration.
- d. Dummy for car crash testing – Patent # 4,701,132 discloses that it is an anatomical model, particularly a dummy, for simulating the effect of an accident on the human body.

### **Summary of Invention**

This new test apparatus design is for the purpose of creating an articulating body form that can be filled with any type of material, that can be contained by plastic, in order to simulate the human body's weight, mass and possible density of the human body. (The possible density of the human body is only created by filling the apparatus cavities with certain types of material).

The apparatus form is created using plastic or plastic type materials that are formed into the shape of the various body parts, i.e. head with neck, torso with neck, thighs, lower legs with formed stationary feet, upper arms and lower arms with formed stationary hand. Each body part will have at least one fill cavity as well as a possible drain plug. Each body part will have fill markings on them that define the weight equivalent in pounds should the apparatus be filled to that point with water. This allows for the apparatus to be used to simulate various body weights as desired for the test. This apparatus is to be used for simulating the body (current design is for an average person height of 5'9" and 175 lbs.; however, other designs may be created in the same fashion that simulate a child, a pregnant woman and/or an obese person).

The thigh and torso are connected using multi-positioning in order to allow for the apparatus to be placed in a sitting position, a sitting position with the knees separated apart and a standing position. The thigh and lower leg are connected in order to allow for a sitting or standing position. These positions will be "locked" into place so that the position is held during usage. The arms will be connected to the torso at the shoulder level and will be able to articulate up and down as well as bend at the "elbow". The head will screw into the neck of the torso.

The apparatus is for the use in a variety of tests in which the human weight, mass and density are required in order to depict the appropriate use of the device being tested. These tests may include:

- a. Seat durability
- b. Seat abrasion
- c. Axle testing
- d. Restraint systems
- e. Road testing of vehicle
- f. Rollover testing
- g. Accident re-enactment

Future test apparatus styles may include:

- a. Ball and socket joints at the hips, knees, elbows and shoulder.
- b. A hip rod that has an articulating joint between the torso & thigh connection
- c. A shoulder connection with an articulating joint between the torso & shoulder

- d. A rod with a spring attached between two rigid pins. The spring component will be placed between the two plastics parts and the rigid pins will be placed through the plastic parts and bolted at the ends.
- e. Articulating feet & hands

### **Brief Description of Drawings**

There are sixteen drawings that depict the multiple components that make up the apparatus and different types of articulating joints that allow the apparatus to be placed in a standing (Option A), sitting position (Option B) or sitting with knees extended out in an open position. These components are:

- a. Head (component 10) is formed by the desired plastic molding process after which a 3" male fill/drain plug is spin welded to create the neck (component 20). In addition, during or after the molding process, determined by which molding process is utilized, two female screw inserts (components 30) are attached in the approximate area of the mouth in order to secure an accelerometer.
- b. Torso (component 40) is formed by the desired plastic molding process, after which a 3 inch raised female fill/drain plug (component 50) is spin welded onto the top of the torso to create the outer portion of the neck. Additionally a 1 inch drain plug (component 60) is spin welded into a recessed area of the lower portion of the torso in order to drain the torso area for easy handling of the apparatus while moving it. The lower portion of the torso has an area (component 70) in which the legs can be attached. The type of area is determined by the attachment method. The torso also has an area (component 80) at the shoulder in which to attach the arms. The type of area (component 90) is determined by the attachment method.
- c. The leg includes two sections the thigh area and the lower leg-calf area. The thigh (component 100) is formed by the desired plastic molding process. The thigh has an area (component 110) in which the legs are attached to the torso by placing the top portion of the thigh into the hip well and against the lower center portion of the torso (component 170). The shape of the attachment area is determined by the attachment method. Each thigh also has a ½ inch drain plug (component 120) that



is spin welded into a recessed area. Additionally, in the knee area of the thigh, a recessed slot (component 130) is created in order to place the peg portion (component 150) of the lower leg (calf portion of the leg – component 160) so the two parts can be attached. The type and shape of the area for the attachments (component 140) is determined by the attachment method. The lower leg (component 160) has a ½ inch drain plug (component 170) spin welded into a recessed area at the back of the heel.

- d. The arm (component 180) is made of 2 separate parts: the upper arm (component 190) and the lower arm (component 200), which are formed by the desired plastic molding process. The upper arm has an area (component 210) in which the arms are attached to the torso by placing the upper interior area of the arm (component 230) against the matching area of the torso (component 80) and attaching by the desired method through the attachment opening (component 210). The shape of the attachment area is determined by the desired attachment method. Each upper arm has a ½ inch drain plug (component 220) that is spin welded into a recessed area. Additionally, the elbow area has a recessed slot (component 240), which is created in order to place the peg portion (component 250) of the lower arm (component 200), inside the elbow recessed slot area so the two parts can be attached. The type and shape of the area on the upper arm for the attachment (component 270) and the lower arm (component 280) are determined by the attachment method. The lower arm has a ½ inch drain plug (component 260) that is spin welded into a recessed area at the end of the hand after the part is made.

### **Description of Invention**

The test apparatus can be made out of a variety of plastic material including, but not limited to, polyethylene, plastisol, PVC, EVA and elastomeric plastic. The body components can be made using a variety of molding methods including but not limited to, cast, injection, blow molding and rotational molding. A mold in the shape of each apparatus part is made (how it is made & out of what material depends upon the method of the desired molding process). Once the mold is made the part is created using the desired process. After each part is formed then the fill/drain plugs will be spin welded into each component to allow for the filling of each part

cavity with the desired substance, of which the most popular substance will be water. Once the spin welds are in place, then the body parts can either be filled at that point & then connected together or put together & then filled.

There are a number of different methods in which to attaché the thigh to the torso, the lower leg to the thigh, the upper arm to the torso, and upper arm to the lower arm components. These methods include, but are not limited to, the following:

- A. **Thigh to Torso:** In order to put the parts together the upper thigh is put into the torso hip wells and connected to the torso using one of the following methods:
  - e. **Concept 1: (1 page diagram)** In the molding process a female screw insert (component 290) is molded into the wall of the torso on each side. This insert receives a pin that is put through a hole in the thigh and screwed in at the time that the thigh & torso are attached in order to lock the thigh in a standing or sitting position. Additionally, an insert plate with four female screw receivers (component 300) is molded into the torso area on each side and four inserts are molded into the thigh portion at the attachment point. After production a coil spring with swivel head is attached to the torso by screwing four screws it the female inserts and the other end of the coil springhead is attached to the thigh by screwing four screws it the female inserts locate in the thigh. This allows for the legs to be positioned in a stand or sitting position as well as the allowing for the legs to be opened and pivoted outward.
  - f. **Concept 2: (1 page diagram)** In the molding process a female threaded opening is created (components 330) in the wall of the torso and four female inserts (component 380) are molded around the opening. Additionally a socket area (component 350) is molded into the thigh. In the outside wall of the thigh and around the opening of the socket an equal number to match the screw openings in the cover plate (component 370) of female inserts are molded into the wall of the thigh. After production a metal plate (component 340) is screwed into the inserts surrounding component 330. Then a ball with threaded shaft (component 360) is screwed through the thigh into the torso-threaded opening (component 330). Next the cover plate (component 370) is placed over the socket ball and screwed into place.

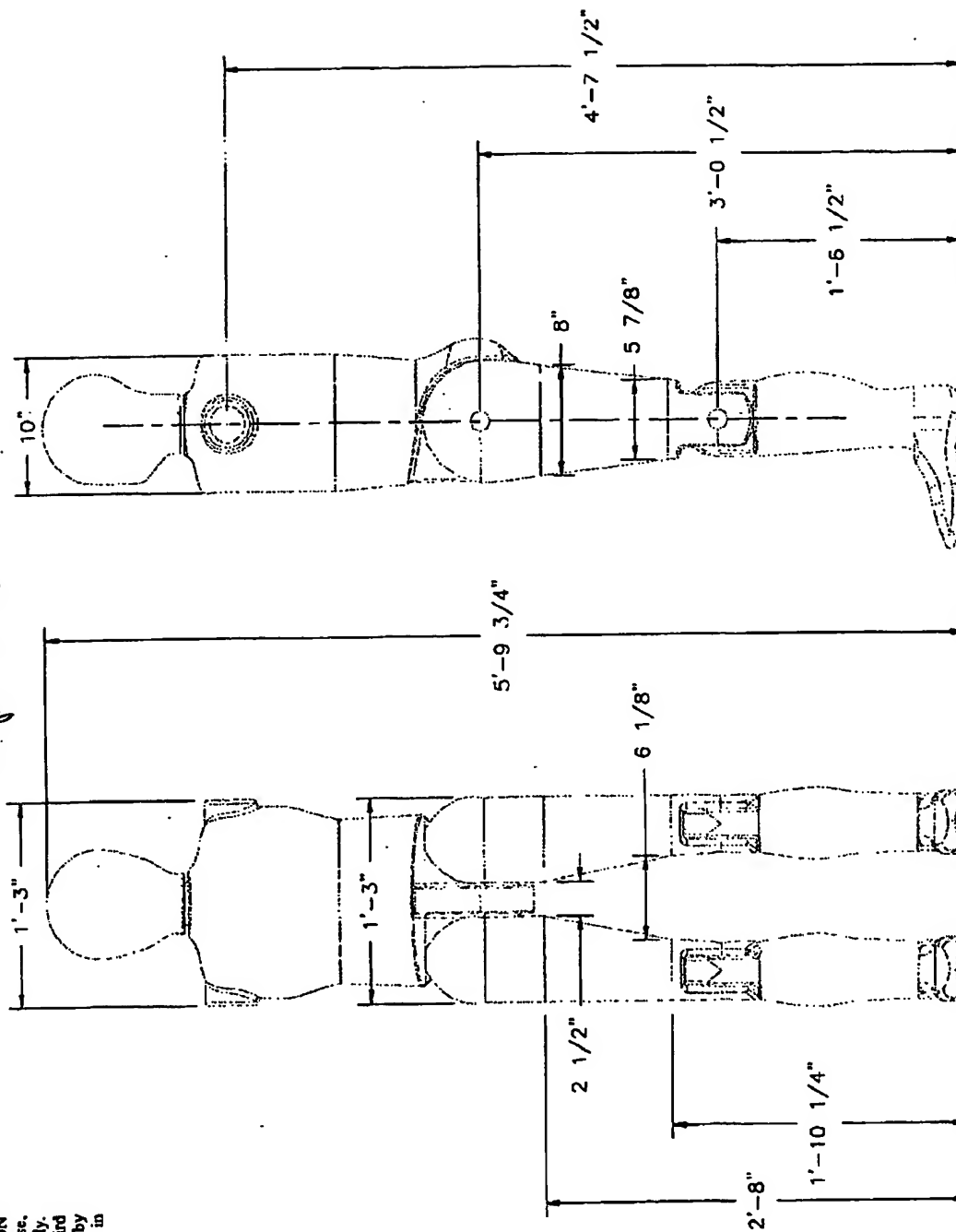
- g. Concept 3: (1 page diagram) In the molding process a female threaded insert (component 390) is molded into the wall of the torso, one on both sides. In addition, a larger female insert (component 410) is molded into the wall of the torso on each side. Four female inserts (component 400) are molded into the inside of each the thigh. After production one side of a swivel hinge plate (component 420) is screwed into the larger female insert (component 410) and the other side is screwed into the female inserts (component 400) molded into the inner thigh. Once the apparatus is placed in its desired position a locking pin is screwed into the locking pin insert in order to lock the apparatus in the desired position.
- h. Concept 4: (2 page diagram) A cone shaped wedge is molded into each thigh (as shown by component 430). An opening (component 460) the size of the pin (component 440) is molded through the torso. A solid pin (component 440) is placed through the opening in the thigh, through the torso opening and through the other thigh. The pin has a cap screwed onto the each end. In addition a locking bolt (component 450) is placed in the wedge area in order to lock the leg into the desired position.
- i. Concept 5: (2 page diagram) The torso design for this concept has been modified to allow for a rectangular peg with a center opening (component 470) to be created at the time of molding. During the molding of the thigh a rectangular wedged hole (component 480) is created. To place the apparatus in its desired position the following is done:
1. The leg is placed in the sitting or standing position by placing the square peg joiner of the torso (component 470) into the rectangular wedge hole (component 480) of the thigh
  2. A metal or rigid plastic pin (component 490), with a cap on one end, is put through the opening in the thigh, though the torso opening & out the other side through the other thigh and a locking bolt is screwed on to the end of the pin. The leg is then able to pivot out. An optional locking wedge (component 500) can be placed as represented on page two of this concept's drawings.

1. **Thigh to Lower Leg:** The peg portion (component 150) of the lower leg (component 160) is placed inside the recessed slot of the thigh (component 130). A pin is then placed through the thigh/knee opening, through the peg portion and the other thigh/knee opening and bolted into place. The knees can be locked into the sitting or standing position by either of the following two methods:
  - i. An insert is molded inside one of the recessed slot walls and two holes are molded in the peg and the other wall of the recessed slot at the position that would lock the knee in a sitting or standing position. A bolt is placed through the openings that align the knee into the desired position and screwed into place.
  - ii. A rectangular groove is molded into each inside wall of the recessed slot and a square peg is molded on the outside of the pin opening. The lower leg is placed in the desired sitting or standing position and then the peg portion (component 150) is slide into the grove and secured with a pin that goes through the outer opening of the recessed slot, the peg opening and the other recessed slot opening. The pin is then bolted on the other end.
2. **Arm to Torso:** In order to have the arms articulate in a similar fashion as the leg the same concepts that are used on the thigh/ torso joining will be utilized for the arm/torso joining.
3. **Lower Arm to Upper Arm:** The peg portion (component 250) of the lower arm (component 200) is placed inside the recessed slot of the upper arm (component 190), a pin is then placed through the upper arm/lower arm opening, through the peg portion and the other upper arm/lower arm opening and bolted into place. The arms can be locked into straight or bent position by the following method:
  - i. An insert is molded inside one of the recessed slot walls and two holes are molded in the peg and the other wall of the recessed slot at the position that would lock the knee in a sitting or standing position. A bolt is placed through the openings that align the knee into the desired position and screwed into place.

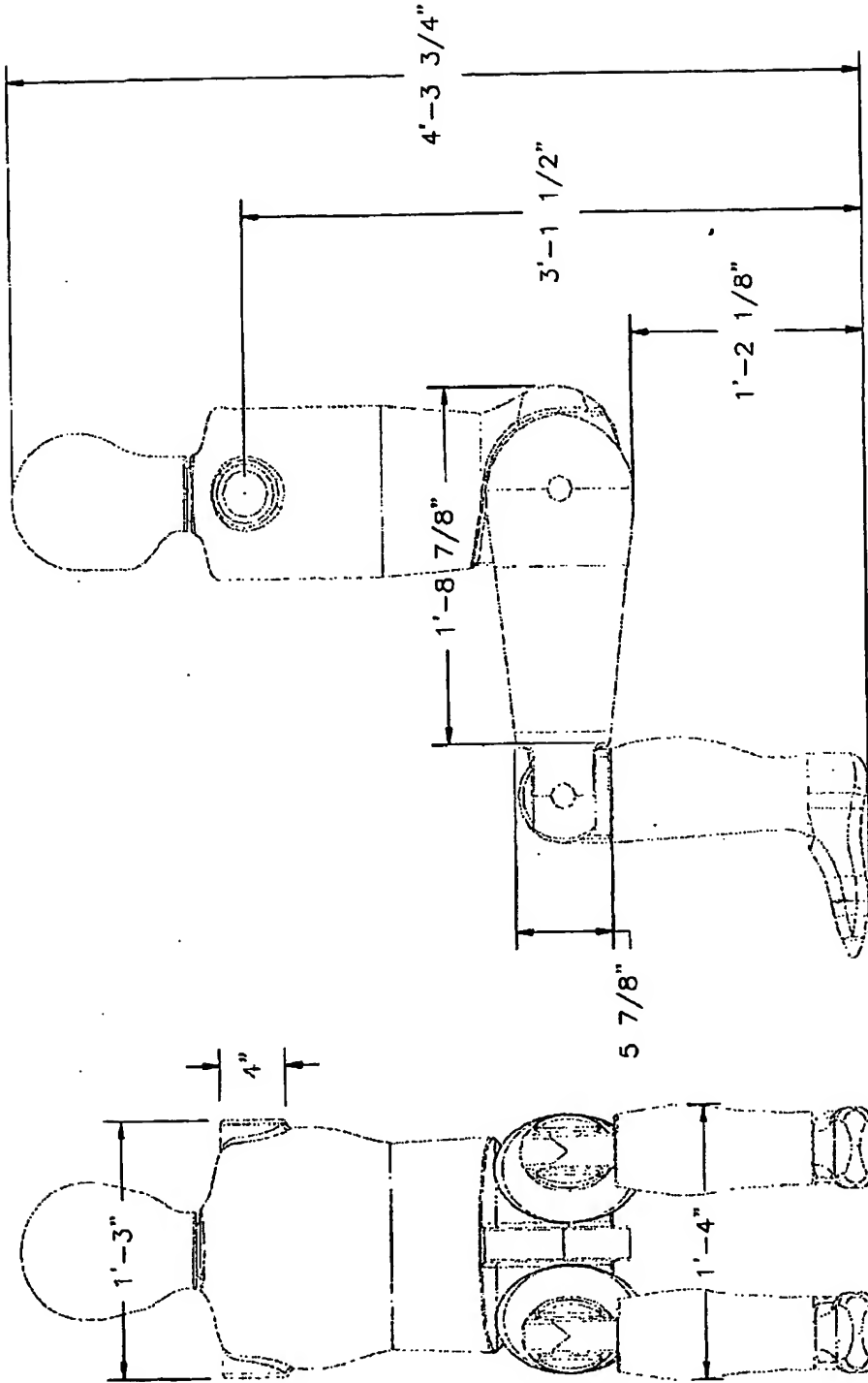
This drawing is property of and is  
 proprietary to Frost Product Marketing  
 Inc. It is to be treated as  
**CONFIDENTIAL INFORMATION**  
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 Frost Product Marketing Inc. in  
 writing.

Frost Product Marketing Inc.  
 5626 Willers Way  
 Houston, TX 77056

Standing Position  
 Option 2

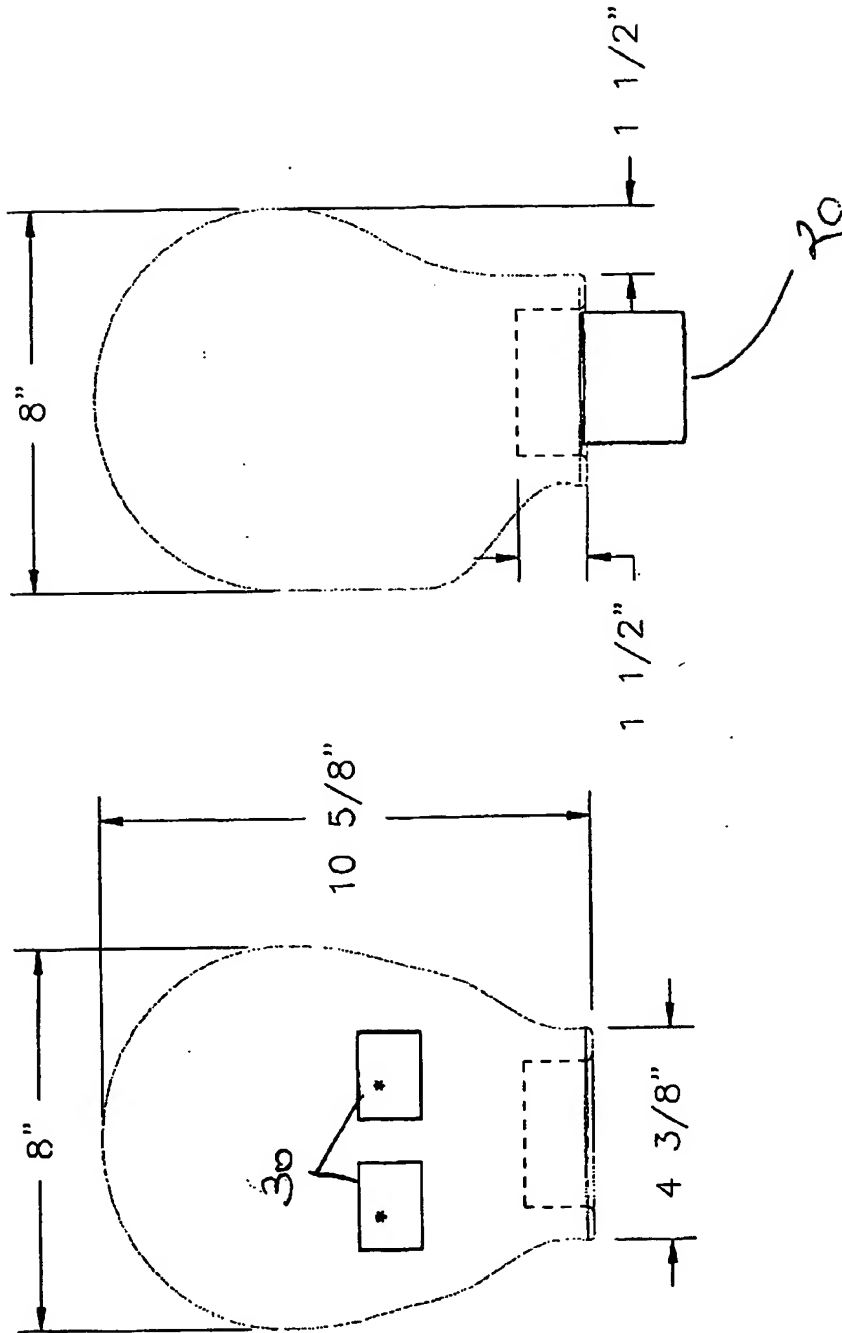


Sitting Position  
Option B



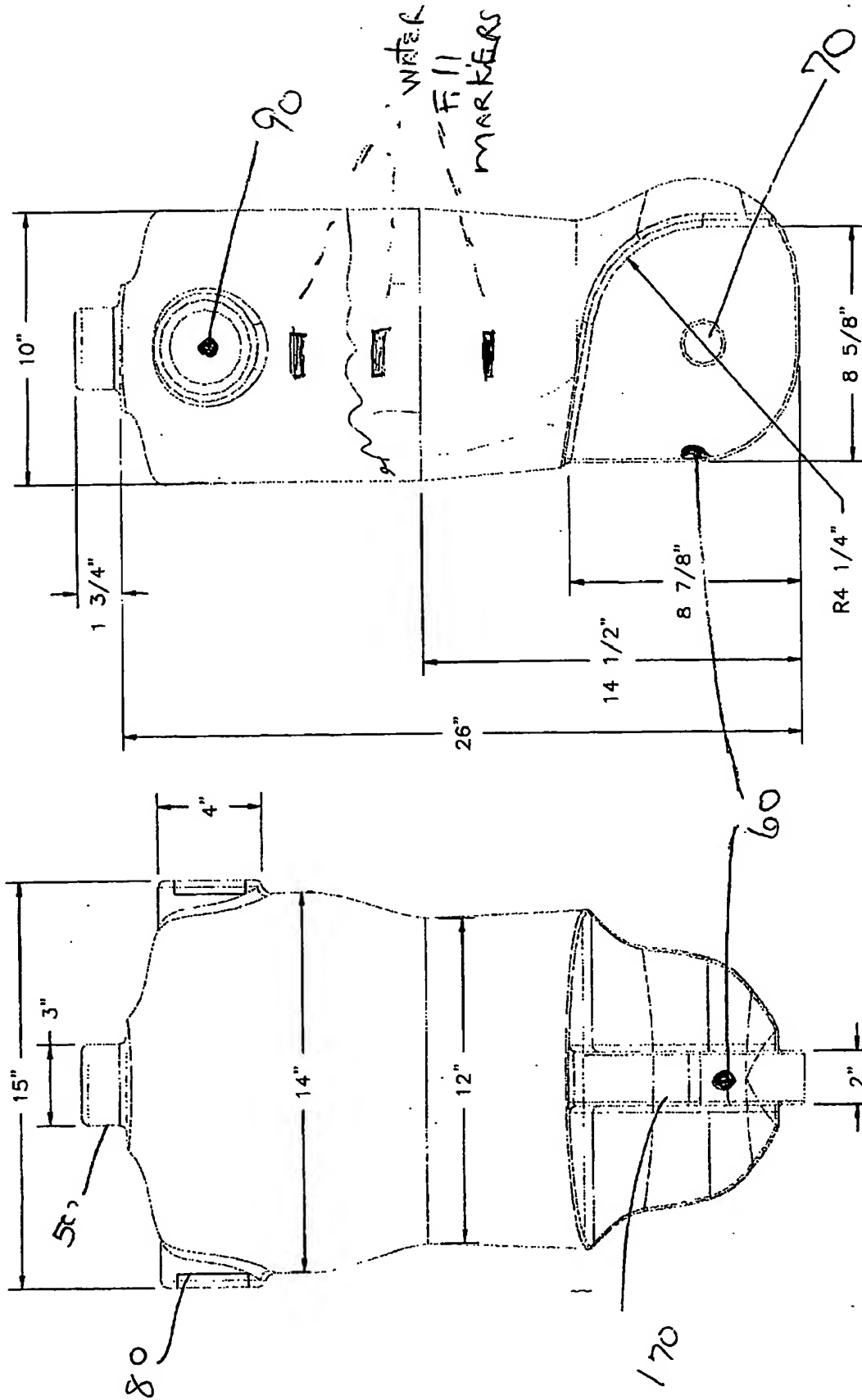
# HEAD COMPONENT 10

SURFACE AREA = 272 SQ. IN.



Top  
Component 40

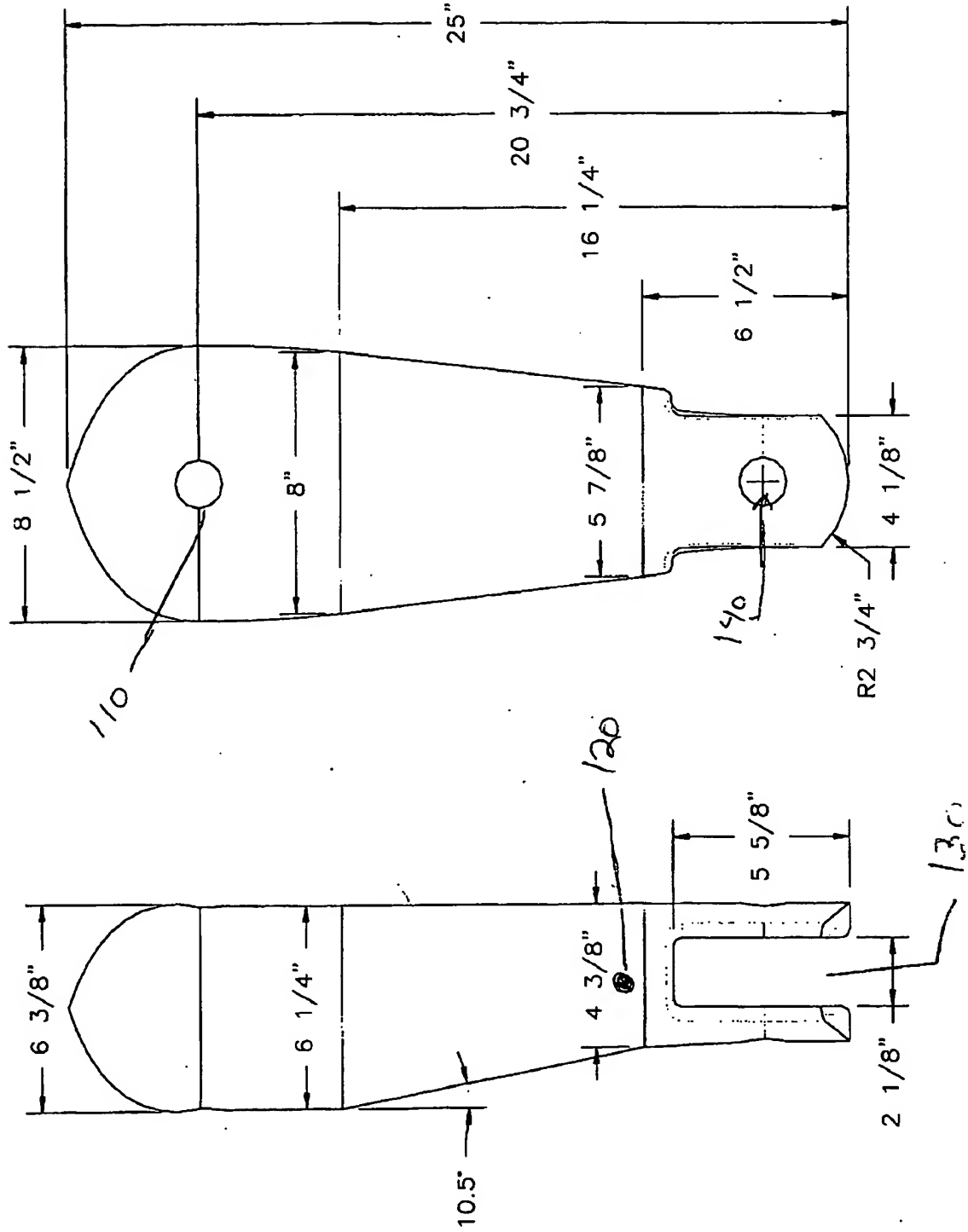
SURFACE AREA = 1083 SQ. IN.





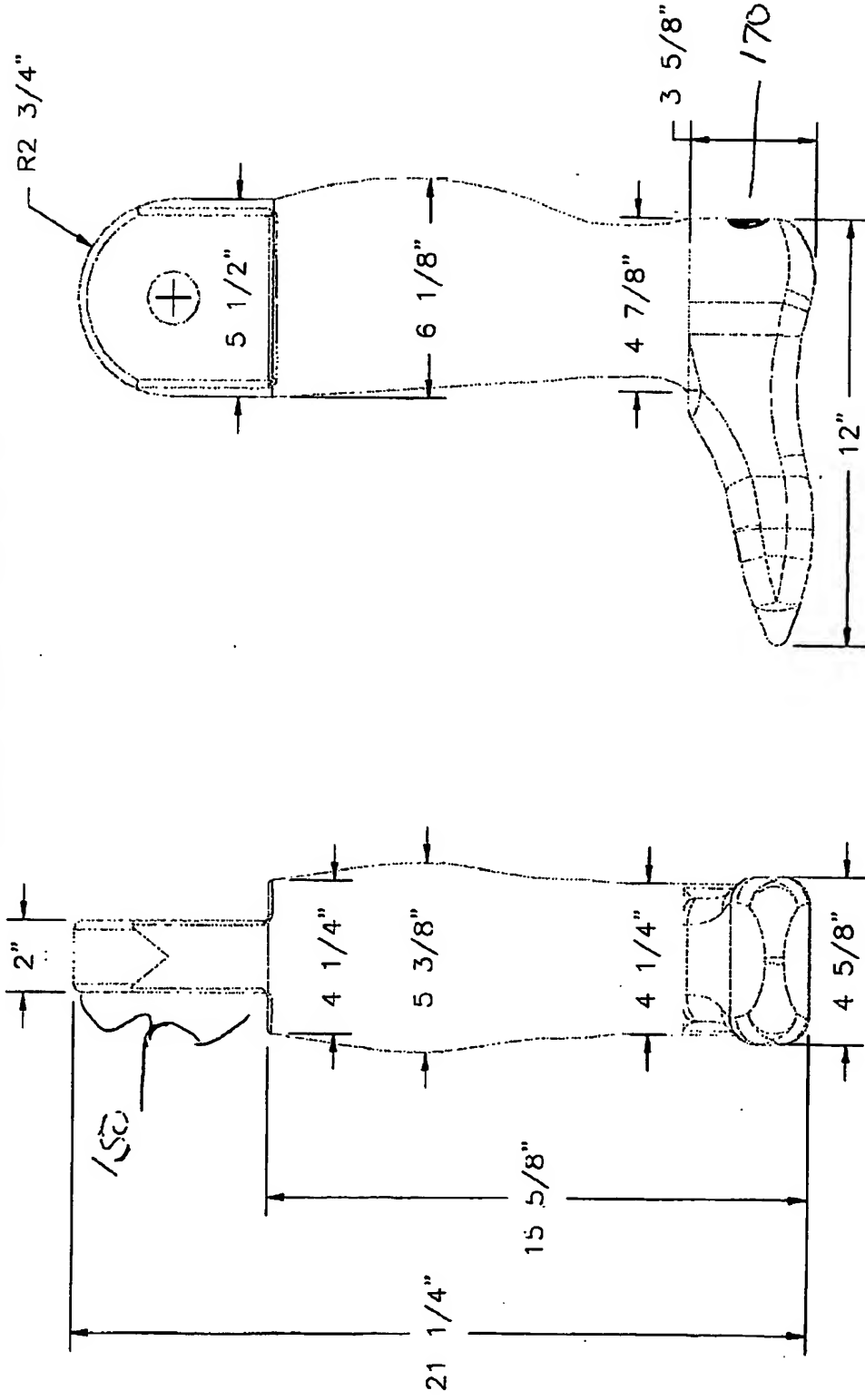
Thigh component 100

SURFACE AREA = 542.4 SQ. IN.

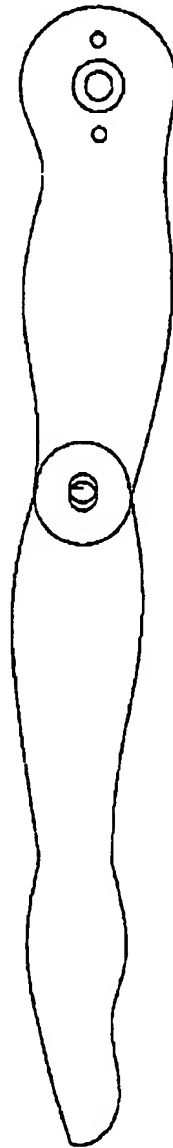
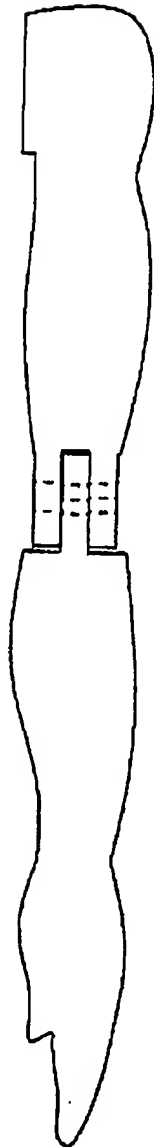


Lower Leg - cast  
Component 16

SURFACE AREA = 419 SQ. IN.



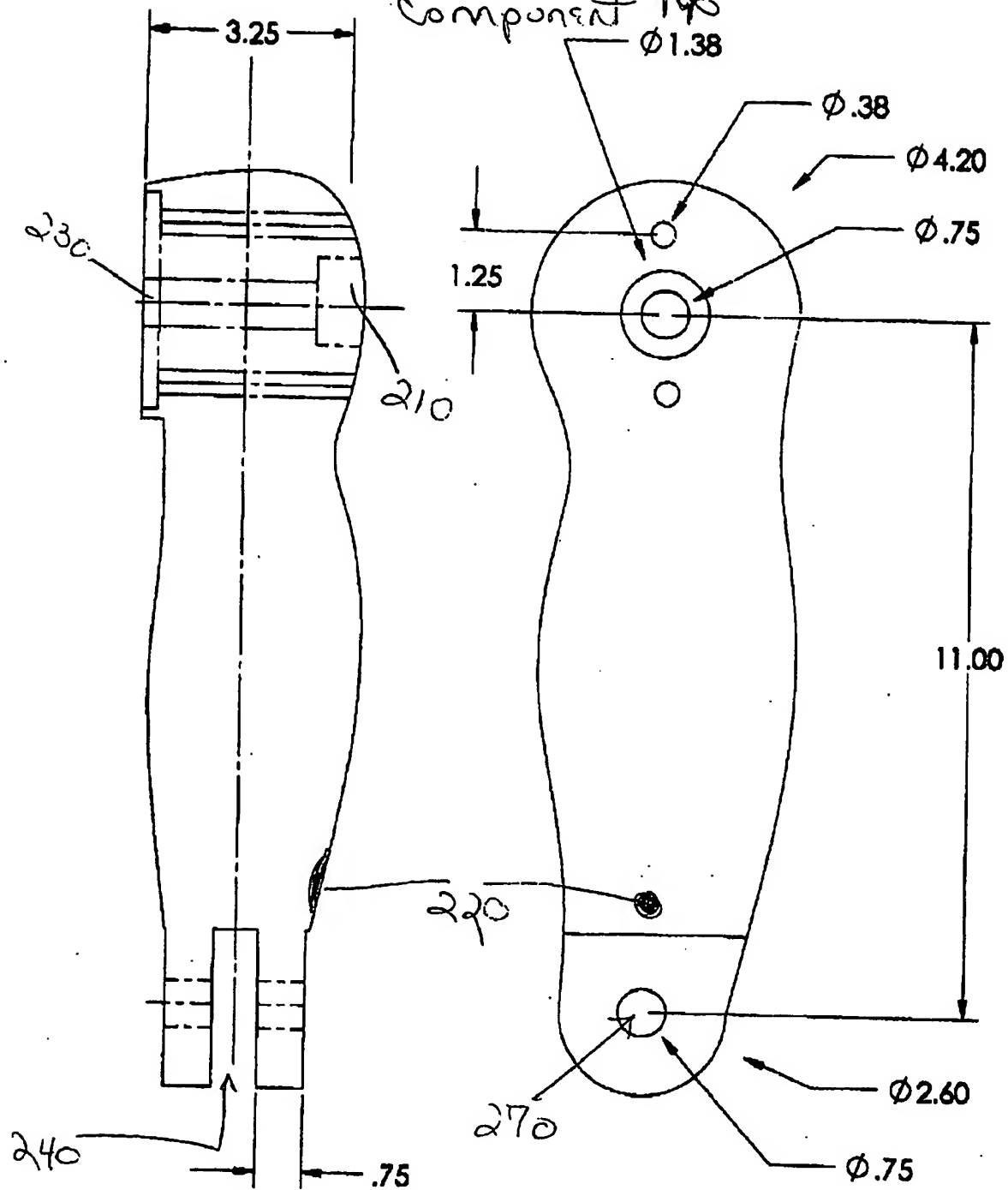
ARM  
component 180



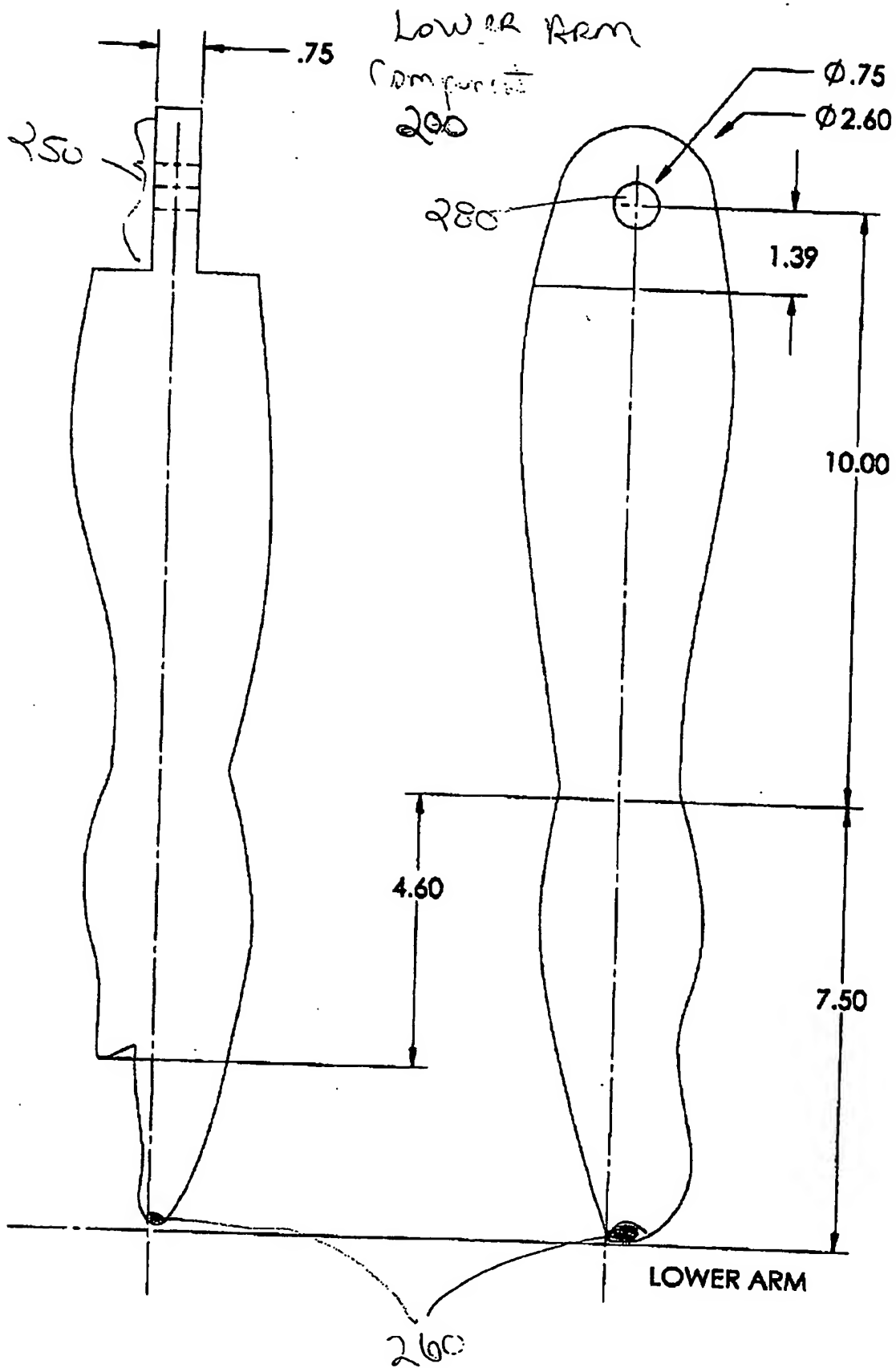
UPPER ARM

LOWER ARM

UPPER ARM  
Component 190



UPPER ARM



Torso

290

PIN & INSERT

LOCK THIGH

IN STANDING

& SITTING POSITIONS

300

310

COIL SPRING W/ SWIVEL

ALLOWS LEG TO PIVOT

& OPEN OUTWARD

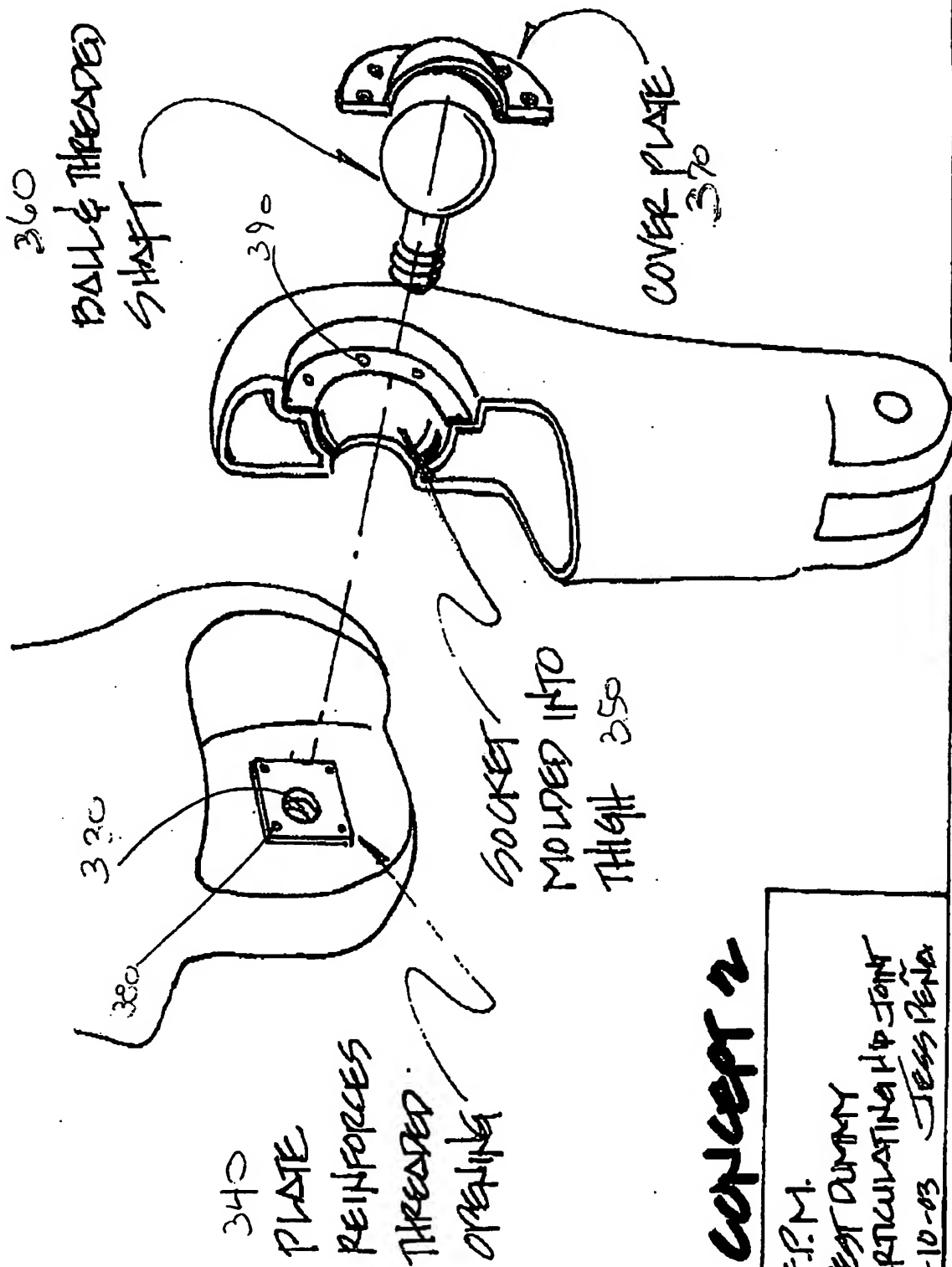
320

CAVITY W/ INSERTS  
ALLOWS OPENING & PIVOT

THIGH

**concept 1**

F.P.M.  
TEST DUMMY  
ARTICULATING HIP JOINT  
11-10-03 JESS PERLA

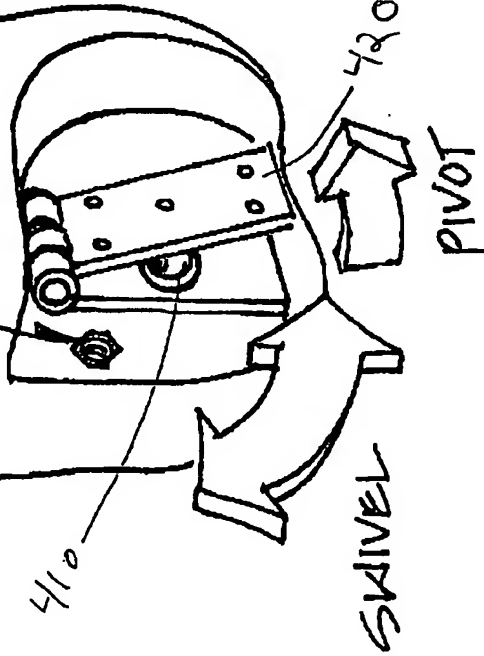
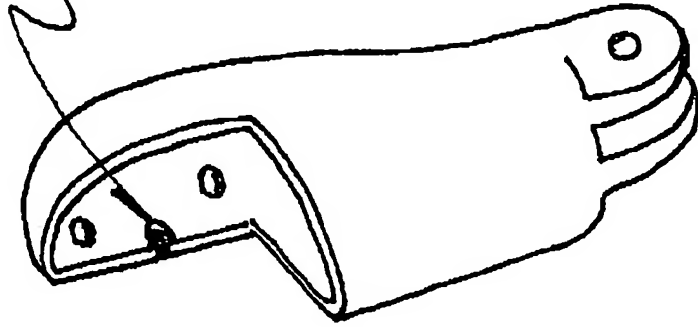


concept 2

F.P.M.  
TEST DUMMY  
ARTICULATING HIP JOINT  
11-10-03 JESS PEÑA

LOCKING PIN INSERT  
390

PIVOTS MOUNTED IN  
400



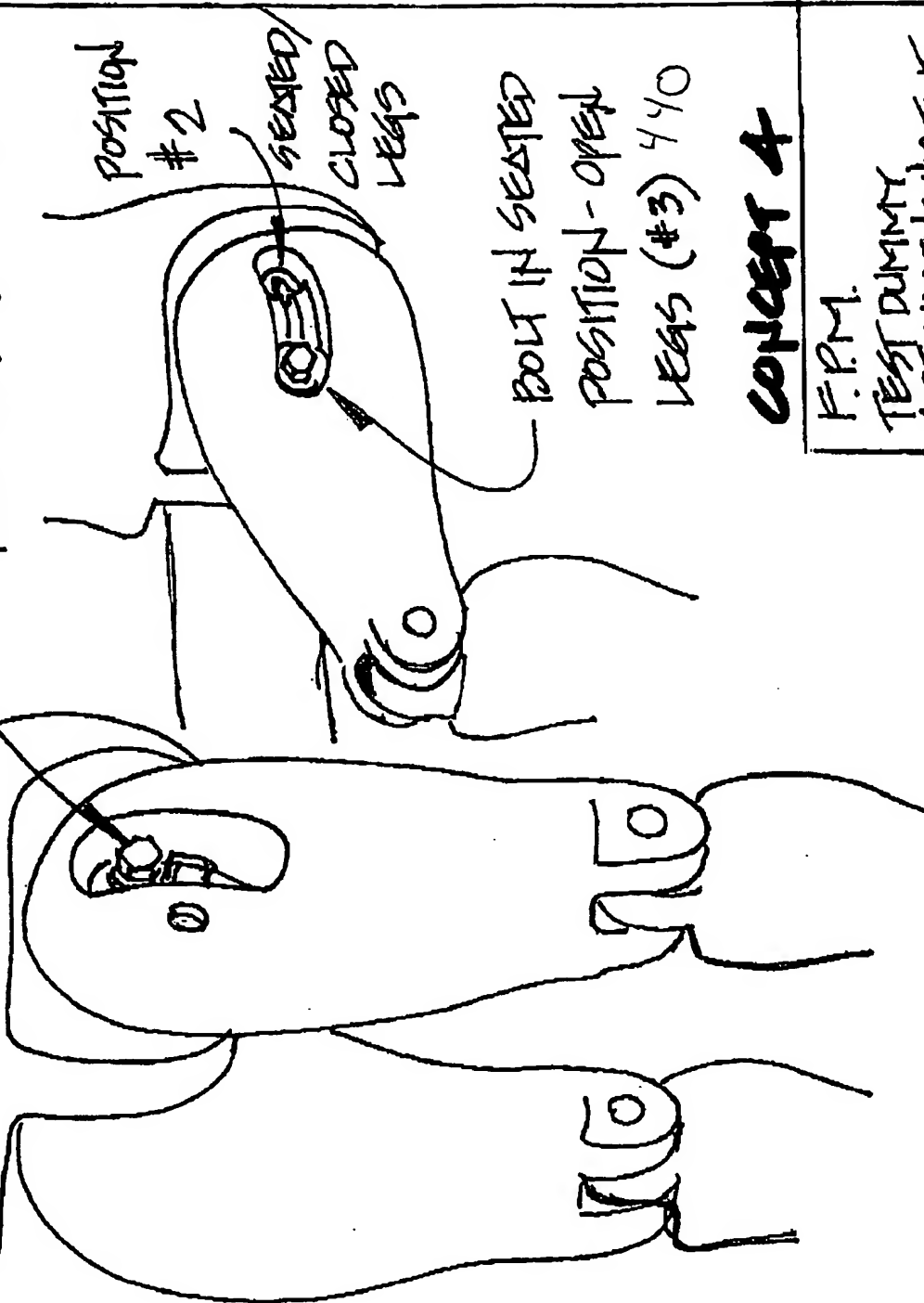
- SWIVEL HINGE ALLOWS 90° MOVEMENT FROM STANDING TO SITTING POSITIONS
- PIVOT ALLOWS CLOSED & OPEN LEG POSITION WHEN SEATED

### CONCEPT 3

ITEM:  
TEST DUMMY  
APPLICATING HIP JOINT  
11-12-03 JESS PERIA



BOLT IN STANDING  
POSITION (#1) 440

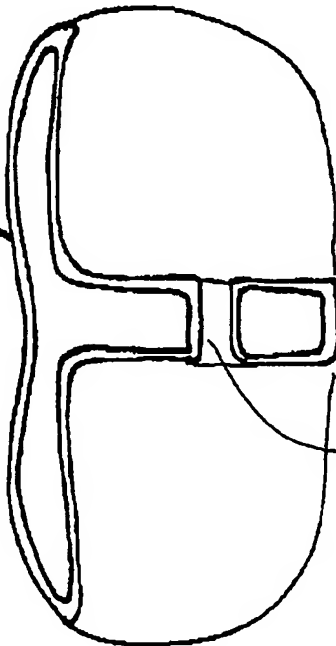


## concept 4

FIRM.  
TEST DUMMY  
ARTICULATING HIP JOINT  
11-12-03 JESSICA

TOP VIEW - SECTION

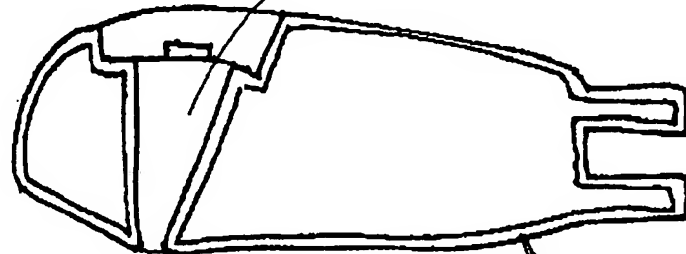
TORSO



460

SEATED (POSITION #2)

LEGS CLOSED



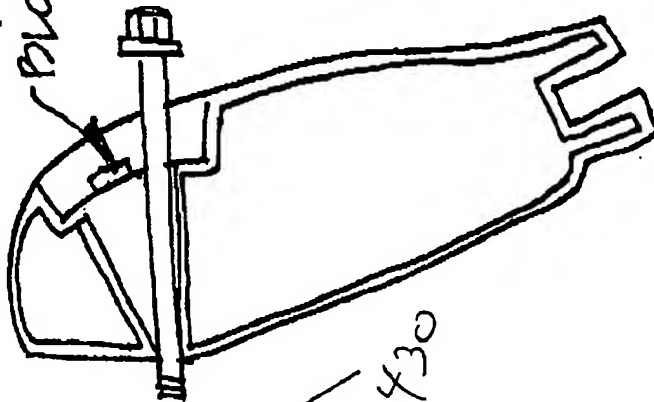
430

SEATED (POSITION #3)

LEGS OPEN

450

LOCKING  
BLOCK



440

CONT 4

F.P.M.

TEST DUMMY  
ARTICULATING HIP JOINT

11-12-03 JESSIE

\* LARGE BLOCK

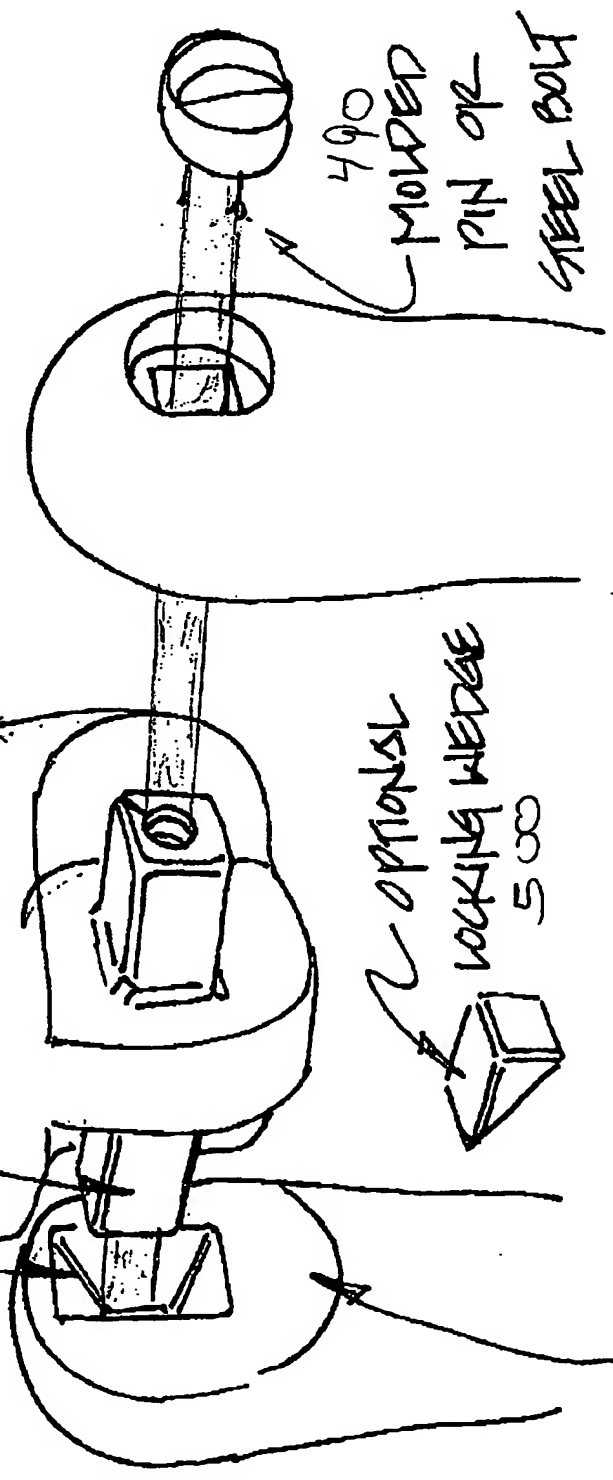
470

RECTANGULAR

WEDGED

HOLE

430



\* WITH LARGE BLOCK PIERCING THE THIGH, THE  
LOAD IS DISTRIBUTED OVER A LARGER  
SURFACE THEREBY REDUCING THE  
RISK OF SUBSTANTIAL STRESS.

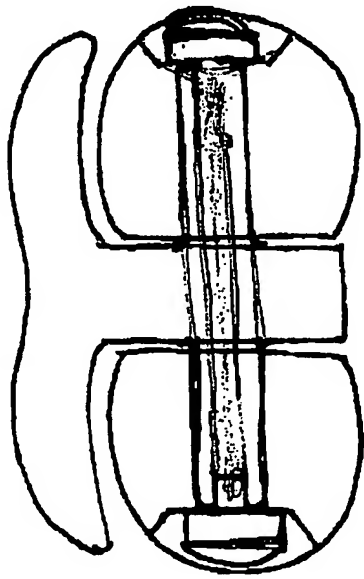
①

FLAT SURFACE

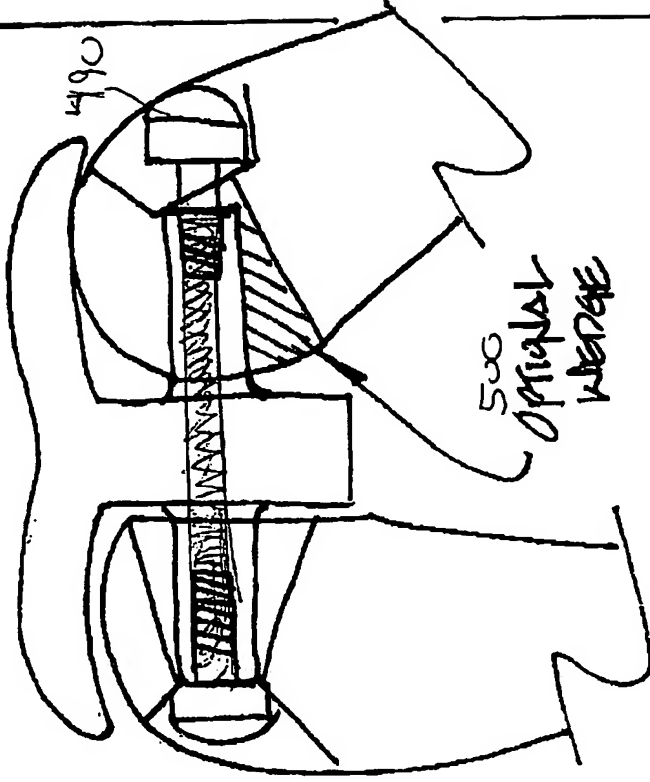
(FOR STATIONING  
& SITUATION POSITIONS)

FROST PRODUCTS  
RIDE DUMMY  
CONCEPT

concept 5 page 1 of 2 JESSICA 11-11-03



STANDING POSITION  
TOP VIEW



SITTING POSITION  
TOP VIEW  
ONE LEG OPEN

2

# Document made available under the Patent Cooperation Treaty (PCT)

International application number: PCT/US04/038125

International filing date: 15 November 2004 (15.11.2004)

Document type: Certified copy of priority document

Document details: Country/Office: US  
Number: 60/519,974  
Filing date: 14 November 2003 (14.11.2003)

Date of receipt at the International Bureau: 22 December 2004 (22.12.2004)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)



World Intellectual Property Organization (WIPO) - Geneva, Switzerland  
Organisation Mondiale de la Propriété Intellectuelle (OMPI) - Genève, Suisse

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